

**What is claimed is:**

1           1. A method for protecting a MEMS structure during a dicing of a MEMS wafer to  
2 produce individual MEMS dies, comprising the steps of:

3           (a) preparing a MEMS wafer having a plurality of MEMS structure sites on a first side  
4 and a plurality of through holes on a second side;

5           (b) mounting, upon the first side of the MEMS wafer, a wafer cap to produce a laminated  
6 MEMS wafer, the wafer cap being recessed in areas corresponding to locations of the MEMS  
7 structure sites on the MEMS wafer;

8           (c) mounting, upon the second side of the MEMS wafer, a layer of dicing tape;

9           (d) dicing the laminated MEMS wafer into a plurality of MEMS dies; and

10          (e) mounting, upon the layer of dicing tape, a layer of transfer tape

11          2. The method as claimed in claim 1, wherein the layer of dicing tape has a UV  
12 releasable adhesive.

13          3. The method as claimed in claim 1, wherein the layer of dicing tape is applied to a  
14 second side of the MEMS wafer after the wafer cap is mounted on the MEMS wafer.

15          4. The method as claimed in claim 1, wherein the layer of dicing tape is applied to a  
16 second side of the MEMS wafer before the wafer cap is mounted on the MEMS wafer.

17          5. The method as claimed in claim 1, wherein the wafer cap comprises a wafer cover and  
18 a spacer layer

19          6. The method as claimed in claim 5, wherein the spacer layer comprises a flexible film  
20 with an adhesive medium on one side.

21          7. The method as claimed in claim 6, wherein the flexible film is transmissive to UV  
22 radiation.

23          8. The method as claimed in claim 5, wherein the wafer cover is a cover tape.

1 9. The method as claimed in 5, wherein a height of the spacer layer prevents the wafer  
2 cover from deflecting in such a manner to come in contact with the MEMS structures.

1 10. The method as claimed in 5, wherein a height of the spacer layer prevents  
2 electrostatically induced damage to the MEMS wafer.

1 11. The method as claimed in 5, wherein a height of the spacer layer prevents  
2 electrostatically induced damage to the MEMS wafer and prevents the wafer cover from  
3 deflecting in such a manner to come in contact with the MEMS structures.

1 12. A laminated MEMS wafer, comprising:  
2 a MEMS wafer having a plurality of MEMS structure sites located on a first side and a  
3 plurality of through holes located on a second side;  
4 a removable wafer cap;  
5 a layer of dicing tape mounted upon the second side of the MEMS wafer; and  
6 a layer of transfer tape mounted upon said layer of dicing tape;  
7 said removable wafer cap being bonded to the first side of the MEMS wafer to produce a  
8 laminated MEMS wafer, the wafer cap being recessed in areas corresponding to locations of the  
9 MEMS structure sites on the MEMS wafer.

1 13. The laminated MEMS wafer as claimed in claim 11, wherein said layer of dicing  
2 tape has a UV releasable adhesive.

1 14. The laminated MEMS wafer as claimed in claim 11, wherein said layer of dicing  
2 tape is applied to a second side of the MEMS wafer after said removable wafer cap is mounted  
3 on the MEMS wafer.

1 15. The laminated MEMS wafer as claimed in claim 11, wherein said layer of dicing  
2 tape is applied to a second side of the MEMS wafer before said removable wafer cap is mounted  
3 on the MEMS wafer.

1 16. The laminated MEMS wafer as claimed in claim 11, wherein said removable wafer  
2 cap comprises a wafer cover and a spacer layer

1 17. The laminated MEMS wafer as claimed in claim 16, wherein said spacer layer  
2 comprises a tape having adhesive on two sides and a flexible film.

1 18. The laminated MEMS wafer as claimed in claim 16, wherein said spacer layer  
2 comprises a flexible film with an adhesive medium on one side.

1 19. The laminated MEMS wafer as claimed in claim 17, wherein said flexible film is  
2 transmissive to UV radiation

1 20. The laminated MEMS wafer as claimed in claim 18, wherein said flexible film is  
2 transmissive to UV radiation.

1 21. The laminated MEMS wafer as claimed in claim 16, wherein said wafer cover is a  
2 cover tape.

1 22. The laminated MEMS wafer as claimed in 16, wherein a height of said spacer layer  
2 prevents said wafer cover from deflecting in such a manner to come in contact with the MEMS  
3 structures.

1 23. The laminated MEMS wafer as claimed in 16, wherein a height of said spacer layer  
2 prevents electrostatically induced damage to said MEMS wafer.

1 24. The method as claimed in claim 1, wherein said layer of transfer tape is applied to  
2 the dicing tape after said layer of dicing tape and the laminated MEMS wafer are sawn.

1 25. The method as claimed in claim 1, wherein said layer of dicing tape comprises a  
2 static dissipative material.

1 26. A method for protecting a wafer during a dicing, comprising the steps of:

2 (a) mounting, upon a backside of a wafer, a layer of dicing tape, the wafer having a front  
3 patterned side and a plurality of etched ports on a backside, the etched ports providing a possible  
4 leak path from a backside of the wafer to the front patterned side of the wafer;

5 (b) dicing the wafer into a plurality of dies; and

6 (c) mounting, upon the diced layer of dicing tape, a layer of transfer tape.

1 27. The method as claimed in claim 26, wherein the layer of dicing tape has a UV  
2 releasable adhesive.

1 28. The method as claimed in claim 26, further comprising the step of:

2 (d) removing the individual diced dies from the wafer.

1           29. The method as claimed in claim 28, wherein individual dies are removed by initially  
2 exposing the dicing tape to UV radiation and disengaging the dies from the dicing tape with a die  
3 ejection needle assembly.

1           30. A wafer, comprising:  
2 a wafer having a front patterned side and a plurality of etched ports on a backside, the  
3 etched ports providing a possible leak path from a backside of the wafer to the front patterned  
4 side of the wafer;  
5 a layer of dicing tape mounted upon the backside of said wafer; and  
6 a layer of transfer tape mounted upon said layer of dicing tape.

1           31. The laminated MEMS wafer as claimed in claim 30, wherein said layer of dicing  
2 tape has a UV releasable adhesive.

1           32. The method as claimed in claim 1 wherein the layer of dicing tape comprises a cover  
2 tape and a perforated tape.

1           33. The method as claimed in claim 32, wherein the cover tape includes an adhesive  
2 medium.

1           34. The method as claimed in claim 33, wherein the adhesive medium is an ultraviolet  
2 light releasable medium

1           35. The method as claimed in claim 33, wherein the adhesive medium is a heat  
2 releasable medium.

1           36. The method as claimed in claim 33, wherein the adhesive medium is a combination  
2 of an ultraviolet light and heat releasable medium.

1           37. The method as claimed in claim 33, wherein the adhesive medium comprises a  
2 thermoplastic organic material.

1           38. The method as claimed in claim 33, wherein the adhesive medium comprises an  
2 ultraviolet light sensitive organic material.

1           39. The method as claimed in claim 32, wherein the cover tape comprises a static  
2 dissipative material.

1 40. The method as claimed in claim 32, wherein the perforated tape comprises a tape  
2 having adhesive on two sides and a flexible film.

1 41. The method as claimed in claim 32, wherein the perforated tape comprises a flexible  
2 film with an adhesive medium on one side.

1 42. The method as claimed in claim 40, wherein the flexible film is transmissive to UV  
2 radiation.

1 43. The method as claimed in claim 41, wherein the flexible film is transmissive to UV  
2 radiation.

1 44. The method as claimed in 32, wherein a height of the perforated tape prevents  
2 electrostatically induced damage.

1 45. The method as claimed in claim 32, wherein the perforated tape comprises a plurality  
2 of layers of perforated tape, an aggregate of the plurality of layers of perforated tape producing  
3 the height to prevent electrostatically induced damage.

1 46. The laminated MEMS wafer as claimed in claim 12, wherein said layer of dicing  
2 tape comprises a cover tape and a perforated tape.

1 47. The laminated MEMS wafer as claimed in claim 46, wherein said cover tape  
2 includes an adhesive medium.

1 48. The laminated MEMS wafer as claimed in claim 47, wherein the adhesive medium is  
2 an ultraviolet light releasable medium.

1 49. The laminated MEMS wafer as claimed in claim 47, wherein the adhesive medium is  
2 a heat releasable medium.

1 50. The laminated MEMS wafer as claimed in claim 47, wherein the adhesive medium is  
2 a combination of an ultraviolet light and heat releasable medium.

1 51. The laminated MEMS wafer as claimed in claim 47, wherein the adhesive medium  
2 comprises a thermoplastic organic material.

1 52. The laminated MEMS wafer as claimed in claim 47, wherein the adhesive medium  
2 comprises an ultraviolet light sensitive organic material.

1 53. The laminated MEMS wafer as claimed in claim 46, wherein said cover tape  
2 comprises a static dissipative material.

1 54. The laminated MEMS wafer as claimed in claim 46, wherein said perforated tape  
2 comprises a static dissipative material.

1 55. The laminated MEMS wafer as claimed in claim 46, wherein said perforated tape  
2 comprises a tape having adhesive on two sides and a flexible film.

1 56. The laminated MEMS wafer as claimed in claim 46, wherein said perforated tape  
2 comprises a flexible film with an adhesive medium on one side.

1 57. The laminated MEMS wafer as claimed in claim 55, wherein said flexible film is  
2 transmissive to UV radiation.

1 58. The laminated MEMS wafer as claimed in claim 56, wherein said flexible film is  
2 transmissive to UV radiation.

1 59. The laminated MEMS wafer as claimed in 46, wherein a height of said perforated  
2 tape prevents electrostatically induced damage.

1 60. The laminated MEMS wafer as claimed in claim 46, wherein said perforated tape  
2 comprises a plurality of layers of perforated tape, an aggregate of the plurality of layers of  
3 perforated tape producing the height to prevent electrostatically induced damage.